

DETAILED ACTION

1. This Office action is based on the remarks filed December 22, 2009, for the 10/549769 application.

Response to Amendment

Claim Rejections - 35 USC 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. **Claims 30, 32-40, and 54-59 are rejected under 35 U.S.C. 103(a) as obvious over O'REAR ET AL (WO 01/64610 A1), hereafter referred to as O'REAR.**

4. With respect to claims 30 and 32-34, O'REAR discloses a process for producing linear alkyl benzene, the process including the steps of obtaining a hydrocarbon condensate containing olefins, paraffins and oxygenates from a low temperature Fischer-Tropsch (F-T) reaction using an iron-cobalt catalyst [page 2, lines 11-13; page 4, lines 15-23; page 7, lines 1-6 & lines 25-29; page 8, line 9] or a cobalt catalyst [page 8, lines 9-10; page 9, lines 4-11] and

- a. fractionating a desired carbon number distribution from the hydrocarbon condensate to form a fractionated hydrocarbon condensate stream which is the product of a Fischer-Tropsch reaction [page 13, line 22 to page 14, line 5; page 30; lines 1-5, which renders the C₈-C₁₆ range obvious by teaching that a C₉-C₁₇ range may be included in the condensate fraction];
- b. extracting oxygenates from the fractionated hydrocarbon condensate stream from step (a) to form a stream containing olefins and paraffins which is the product of a Fischer-Tropsch reaction [page 2, lines 14-16];

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c. alkylating olefins in the combined stream from step (b) with benzene in the presence of a suitable alkylation catalyst in an alkylation reactor [page 29, line 30 to page 33, line 31]; and

d. recovering linear alkyl benzene from the alkylation reactor [page 33, line 26].

5. Furthermore, O'REAR discloses that the F-T reaction is carried in a slurry bed reactor at a temperature of 160-280° C (and, more particularly, 210-260° C) and in the presence of a cobalt catalyst [page 8, lines 9-10; page 9, lines 4-11] to provide a hydrocarbon condensate [page 11, lines 7-12; page 30; lines 1-5], which is substantially the same as the process to obtain the F-T condensate in the instant application.

6. With respect to claims 32-33 and 35, O'REAR does not appear to explicitly disclose that the hydrocarbon condensate contains 60 to 80% by weight paraffins and 10 to 30% by weight olefins, and, more particularly, less than 25% by weight. However, it is expected that such a requirement is inherent in the invention of O'REAR since the feed, the reaction conditions [page 11, lines 7-19], reaction vessel (slurry reactor), and catalyst (cobalt on an alumina support) are similar to those disclosed in the instant application.

7. Alternatively, it would have been obvious to one of ordinary skill in the art to modify any of the aforementioned variables to obtain a hydrocarbon condensate containing 60 to 80% by weight paraffins and 10 to 30% by weight olefins, and, more particularly, less than 25% by weight olefins, because the feed, reaction conditions, reaction vessel, and catalyst of O'REAR are similar to those disclosed in the instant application, and it has been held that the provision of adjustability of variables or parameters, where needed, involves routine skill in the art. *In re Stevens*, 101 USPQ 284 (CCPA 1954).

8. With respect to claims 36-37, O'REAR does not appear to explicitly disclose that the olefins in the hydrocarbon condensate have the required linearity. However, it is expected that such a requirement is inherent in the invention of O'REAR since the feed, the reaction conditions, reaction vessel, and catalyst are similar to those disclosed in the instant application.

9. Alternatively, since the reaction conditions, reaction vessel, and catalyst of O'REAR are similar to those disclosed in the instant application, it would have been obvious to one of ordinary skill in the art to modify any of the

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aforementioned variables to obtain a hydrocarbon condensate with the required linearity, since it has been held that the provision of adjustability of variables or parameters, where needed, involves routine skill in the art. *In re Stevens*, 101 USPQ 284 (CCPA 1954).

10. With respect to claims 38-40 and 55-57, O'REAR discloses that the hydrocarbon condensate is fractionated in step a) into the C₉-C₂₆ range [page 15, paragraph 1 & page 30, paragraph 1]. O'REAR does not appear to explicitly disclose that the fractionated hydrocarbon product contains 10 to 30% by weight olefins with a degree of linearity greater than 92%. However, as previously discussed, it is expected that such a requirement is inherent in the invention of O'REAR since the feed, reaction conditions, reaction vessel, and catalyst are similar to those disclosed in the instant application.

11. Alternatively, since the feed, reaction conditions, reaction vessel, and catalyst of O'REAR are similar to those disclosed in the instant application, it would have been obvious to one of ordinary skill in the art to modify any of the aforementioned variables to obtain a hydrocarbon condensate with the required linearity and olefin concentration, since it has been held that the provision of adjustability of variables or parameters, where needed, involves routine skill in the art. *In re Stevens*, 101 USPQ 284 (CCPA 1954).

12. With respect to claim 54, O'REAR discloses that an example of an alkylation reaction that can be used in the process disclosed above is the UOP Detal process [claim 13], which uses a solid acid catalyst. Similarly, O'REAR teaches the same catalysts as disclosed in the instant application [see page 33, lines 1-5].

13. With respect to claims 58 and 59, O'REAR does not appear to the degree of linearity. However, it is expected that the required limitations are inherent to the process since the reaction feeds and processes are the same (e.g., both may be a UOP Detal process).

14. **Claims 31 and 41-53 are rejected under 35 U.S.C. 103(a) as being unpatentable over O'REAR ET AL (WO 01/64610 A1) as applied to claims 46, 48-57, and 71 above and in further view of BECKER (DE 19911910 A1) and DE WET ET AL (WO 02/31085 A2), hereafter referred to as O'REAR, BECKER, and DE WET, respectively.**

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15. Since BECKER is equivalent to the Republic of South Africa application No. 2000129, which is in the English translation, the Examiner will reference that application as the disclosure of the DE 19911910 A1 patent.

16. With respect to claims 47, 58-61, and 64-70, O'REAR discloses that the hydrocarbon condensate is treated by extraction to remove oxygenates and other by-products of a F-T synthesis. O'REAR does not appear to explicitly disclose that a light solvent comprising methanol and water is used in the extraction; that the water concentration is more than 3% by weight, more particularly between 5 and 15% by weight; the concentration of olefins and paraffins and oxygenates in the feed and exit streams to a stripper column, recovery rates of olefins and paraffins, or that the olefin/paraffin ratio is preserved in the extraction.

17. However, BECKER, which is concerned with a process for separating oxygenates from a hydrocarbon flow, discloses a liquid/liquid extraction process using a light solvent comprised of methanol and water [page 1, paragraph 1 & page 2, paragraph 5]. BECKER does not appear to explicitly disclose that the water concentration in the light solvent is more than 3% by weight, and more particularly between 5 and 15% by weight.

18. However, DE WET, which is concerned with the separation of oxygenates from hydrocarbons, discloses an extraction system using a light polar solvent, although not specifically methanol, comprising water in a concentration less than 19%.

19. At the time of the invention, it would have been obvious to one of ordinary skill in the art to have modified the process of BECKER with the solvent content of DE WET because such an amount is effective in the extracting process. Furthermore, it would have been obvious to one of ordinary skill in the art to modify the process of DE WET with the solvent components of BECKER including methanol because the solvents are inert relative to the oxygenates, thermally stable, have a sufficiently low freezing point, and have negligible affect on utility of the product as explained by BECKER [page 2, paragraph 7]. Additionally, at the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the process of O'REAR with the extraction process of modified BECKER because the process is simple and removes oxygenates from the largest possible spectrum of hydrocarbons as disclosed by BECKER [page 2, paragraph 3]. Alternatively, it would have been obvious to one of

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ordinary skill in the art to modify the process of O'REAR with the extraction process of modified DE WET since O'REAR discloses the necessity of separating oxygenates from a hydrocarbon condensate [page 2, lines 14-16] and DE WET is an obvious choice since the hydrocarbons fractions being separated are similar to that of O'REAR [page 5, paragraph 5 of DE WET] and the hydrocarbons and oxygenates are formed under similar F-T conditions [page 1, paragraph 2 of DE WET].

20. None of the prior art references appear to explicitly disclose the concentration of olefins/paraffins and oxygenates in the feed and exit streams to a stripper column, recovery rates of olefins and paraffins, or the preservation of the olefin/paraffin ratio in the extraction process. However, it is expected that the process of modified O'REAR has the required limitations since the F-T feedstock and extraction process is similar to that disclosed in the instant application. That is, since the extraction process of modified BECKER is essentially the same as the claimed process (similar solvents, similar F-T hydrocarbon fractions, and similar solvent to feed ratios) , it is expected that the concentration of olefins/paraffins and oxygenates in the feed and exit streams to a stripper column, the recovery rates of olefins and paraffins, and the olefin/paraffin ratio will meet the limitations recited in the instant application.

21. With respect to claims 62 and 63, reference is made to the preceding discussion of modified O'REAR. In addition, DE WET discloses that the tops product from a solvent recovery column comprising a polar solvent (in this case, the methanol/water combination of modified DE WET) and olefins/paraffins is recycled back to the extraction column [reference element 40, figure 1; page 8, paragraph 1].

22. Similarly, BECKER discloses that the tops product (gas flow) from a solvent regeneration column [reference element 9, figure 3] comprising a polar solvent and olefins/paraffins is recycled back to the extraction column [via reference elements 2, 12, 14, and 16 in figure 3; page 6, paragraph 3 to page 7, paragraph 1]. Furthermore, since the gas flow [reference element 12, figure 3] contains solvent and hydrocarbons, which is recycled to the extraction column, it is also analogous to the bottoms product of the solvent recovery column in the instant application. While there may be a slight difference in the operating conditions of the solvent recovery column between BECKER and the instant application, the applicant is reminded that if the prior art device, in its normal and usual operation, would

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necessarily perform the method claimed, then the method claimed will be considered to be anticipated by the prior art device. When the prior art device is the same as a device described in the specification for carrying out the claimed method, it can be assumed the device will inherently perform the claimed process. *In re King*, 231 USPQ 136. In this case, the claim requires recycling a distillation bottoms product comprising water, oxygenate, and olefins/paraffins of which most of the olefins/paraffins and oxygenates are subsequently decanted leaving water (solvent) to be recycled. BECKER discloses a gas flow comprising solvent gas comprising water and hydrocarbons (olefins/paraffins), which are subsequently decanted leaving the solvent gas comprising water to be recycled.

Response to Arguments

23. The applicant has argued that the fraction described by O'REAR is not a condensate fraction because it contains fines. Furthermore, the applicant has argued that the F-T condensate in O'REAR is used to provide a C₆-C₈ fraction, which is subsequently used to form aromatics. The applicant has argued that the condensate is not alkylated to form linear alkyl benzene.

24. The applicant's arguments are not persuasive for the following reasons. First, a condensate fraction is dependent upon the boiling point range of the components, not whether there are catalytic fines entrained in the product. In addition, nowhere in the specification has the applicant defined a condensate fraction to exclude any fines. Second, O'REAR teaches that the condensate fraction includes C₅-C₂₀ normal paraffins and higher boiling hydrocarbons. The teaching of O'REAR sets a lower boiling point range of approximately 97° F (i.e., the boiling point of normal pentane). On page 13, lines 27-30, O'REAR teaches that the condensate fraction includes hydrocarbons boiling above 650° F, which corresponds approximately to the boiling point of normal pentacosane (n-C₂₅) and teaches that a C₁₈-C₂₆ fraction is directed to an alkylation reaction. O'REAR also teaches that a C₉-C₁₇ fraction may also be directed to the alkylation process [page 30, lines 1-5]. Therefore, O'REAR teaches that a desired F-T condensate fraction of C₉-C₂₆ hydrocarbons are directed to an alkylation process contrary to the applicant's assertion.

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25. The applicant has argued that O'REAR does to disclose the degree of linearity required in the instant application.

26. The applicant's argument is not persuasive because the previous and current Office actions have given prima facie reasons why the limitations are inherent to the process of O'REAR. The applicant is encouraged to provide evidence showing that the degree of linearity is not inherent in O'REAR. However, absent any evidence, the rejection stands.

27. The applicant has argued that O'REAR does not teach all the process steps of claim 30 because O'REAR teaches a dehydrogenation step between the F-T process and the alkylation process and claim 30 recites that a product of a F-T stream is alkylated (for a better description of the argument, see page 9, 2nd paragraph of remarks filed December 22, 20009).

28. The applicant's argument is not persuasive because it is the position of the Office that the feed to the alkylation process, regardless of whether there is an intermediate dehydrogenation step, is a F-T product, especially in view of the open claim language. In order to fully describe the applicant's process, as an example, it is recommended that part c) of claim 30 be amended to recite: "directly feeding the raffinate stream containing olefins and paraffins from step b) to an alkylating stage with benzene in the presence of a suitable alkylation catalyst to produce linear alkyl benzene and linear paraffin."

29. The applicant has argued that, in some instances, O'REAR teaches the omission of the oxygenate removal step (i.e., the extraction of oxygenates) and, therefore, teaches away from the instant invention.

30. The applicant's argument is not persuasive because O'REAR teaches in other places the extraction step as described in the previous and current Office action. A description of an embodiment of the process wherein one of the steps omitted is not sufficient to suggest that the reference teaches away from the claimed invention when the reference teaches the recited embodiment in another location of the reference as discussed above. The reference as a whole must be considered.

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Conclusion

31. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRIAN MCCAIG whose telephone number is (571) 270-5548. The examiner can normally be reached on M-F 8-430.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BAM
4/7/2010

/ROBERT J. HILL, JR/
Primary Examiner, Art Unit 1797

